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FIRST RESULTS FROM A NEW METHOD OF TAGGING SALMON  
—THE CODED WIRE TAG

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First results from a new method of tagging salmon -

The coded wire tag

by John Browne

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This leaflet describes the use of a new and highly sophisticated method of tagging salmon. The tag is a microscopic piece of steel carrying a binary-coded number. It is injected into the nose of the young fish and can be recovered at any time subsequently by passing the fish through a magnetic detector. More than 127,000 juvenile salmon were tagged in 1979 and the first of these were recaptured as grilse in the summer of 1981.

Research work initiated by Eileen Twomey in 1975 at the Fisheries Research Centre showed that hatchery-reared smolts were making a significant contribution to the national salmon catch. Hatchery-reared fish are recognised by the absence of the adipose fin, Fig. 1, which is clipped off before the fish are released. The adipose fin is generally thought to be rudimentary and its removal does not seem to affect the fish in any way.

The results obtained showed that the proportion of hatchery-reared fish in the commercial catch varied from 2% in the Northwest to 13% on the Clare and Galway coasts. This work gave information on the contribution of hatcheries to the national salmon harvest. The Electricity Supply Board (ESB) have proposals to increase significantly the production of reared smolts for release. It is clearly essential to have information on the survival of hatchery salmon, on the efficiency of various rearing stations and on aspects of husbandry such as the best time for releasing the young fish. This information cannot be obtained by the fin-clipping technique alone but the coded wire tag can provide the answers to many of the vital questions.

### The coded wire tag

The tag is extremely small, just visible to the naked eye. It comes as a binary coded stainless steel wire and is cut into lengths of approximately 1.1mm with a diameter of 0.25mm: smaller than the dot on an "i". Under a microscope the marks on the tag which make up a code in binary numbers can be read to identify a particular experimental group of fish.

A tag injector feeds the coded stainless steel wire from a spool through a hollow needle, cuts off tags of the appropriate length and implants them automatically. Head moulds specially made for each size of fish being tagged ensure correct placement of the tag in the cartilage of the head.

The magnetic detector makes a "bleep" sound when a tagged salmon is passed through it. A core of about 2cm diameter is removed from the head of any fish which gives a positive reaction. The tag is recovered by dissecting the core under a microscope in the laboratory and the tag can then be decoded. A reward of £2 was paid for each tag recovered.

### Tagging

The experiment began in the autumn of 1979 when 127,000 parr were tagged at hatcheries in five catchments:

Boyne  
Lee  
Shannon  
Corrib  
Burrishoole

The fish were tagged in batches, each batch with a specific code. They were also fin-clipped and then returned to the rearing ponds. In the Corrib system, external Floy tags were also used so that we will be able to compare the results of the Coded wire tagging with systems which have been used previously. This will enable us to use past data in conjunction with present and future work. In

addition to the hatchery stocks, 10,000 wild smolts were tagged in the Corrib system and the results from these will give a basis for assessing the performance of the hatchery-reared fish. The hatchery smolts were released in May 1980.

### Recoveries

In the summer of 1981 detectors were operated at most of the major landing places and markets around the coast.

Each tagged fish recovered was weighed and measured and had a sample of scales removed for examination. No recoveries were made from the smolts released from the Boyne hatchery and we are presently investigating the problem there. From the other four river systems, of the estimated 77,000 tagged smolts which migrated in 1980, 840 tagged grilse were recaptured the following year: a rate of just over 1%. These results, complete to the end of October 1981, account for the grilse catch but some further information will be available next year from spawning fish captured at hatcheries and of spring fish to be caught in 1982.

Only a sample of the salmon caught in each area was examined so that the number of tags recovered represents only a proportion of the tagged fish caught. Figures will be available for the catch from each of the districts where monitoring of tags took place and it will then be possible to estimate the likely number of tags taken in each area. In the meantime the recovery as presented can be viewed as minimum figures and gives an indication of the proportion of reared fish in the catch in each area. A figure for the likely contribution to the sea areas from each rearing station based on the number of smolts released is given Figures 2 to 5 which show the numbers of tags recovered in each sea area. The sea areas were chosen to utilise the information on recaptures returned by fishermen and others. Information on place of recapture in some areas is of necessity vague and can only be ascribed to fairly large general areas, some of which overlap.

Figure 2 shows the returns from a number of different experimental releases from the E.S.B. salmon rearing station at Parteen. The recoveries are well spread out over the area sampled with a

predictable concentration in the Clare-Limerick area. The approximate number of smolts released from Parteen for migration in 1980 was 165,000. The possible contribution from this number of smolts to each of the sea areas is shown by an arrow in Fig. 2. The recovery of tags from this rearing station, at approximately 1% is high and compares well with the recovery at sea of the wild smolts tagged in the Corrib.

Figure 3 shows the distribution of returns from the fish tagged at Galway from the River Corrib and Cong rearing station. The returns were from Donegal to West Cork with the main concentration in the Galway area. The few returns from Cong hatchery stock appeared in the River Corrib catch but presumably the migration paths are similar to those of the wild stock. There were very few fish tagged at Cong (2650) and consequently few returns.

Recoveries from fish tagged at the E.S.B. salmon rearing station at Carrigadroghid are shown in Figure 4. Apart from the small numbers recaptured in Donegal, there is a relatively tight distribution of returns around the Cork area. In a previous tagging experiment the main concentration of recoveries outside the Cork area was from the North Mayo coast. (Fishery Leaflet, 103) The migration paths may well differ from year to year.

Figure 5 shows recoveries from fish tagged at the Salmon Research Trust salmon rearing station on the Burrishoole system. There is a very tight distribution of returns indicating an accurate homing instinct. The 7 recaptures to the south were taken in Galway Bay.

### Discussion

These results are presented as a general synopsis of the recoveries obtained in 1981 from the coded wire tag programme. They have yielded some basic information on migration which fits into the general pattern already established by previous work on smolts. Details of survival from each experimental planting in the four areas and a more detailed plotting of the precise area of recapture awaits further analysis. Meanwhile the results indicate:

1. The contribution of the various hatcheries to the national stock.
2. The areas that benefited from the salmon smolts released from the various hatcheries.
3. The overall survival of reared and wild salmon smolts.
4. A basis for the rational development of rearing facilities and the location of these facilities.

The success of this project is a direct result of the co-operation of fishermen and the facilities and help given by fish processors and buyers around the coast. The project has shown clearly that the salmon smolt rearing stations are making a useful addition to the numbers of salmon caught and processed. The rational development and extension of rearing stations will undoubtedly provide yet more salmon for the fishery.

The tagging has already indicated that some rearing stations make a greater contribution than others. The questions of vital concern to all parties, both to the ESB and to the fishery authorities which operate the rearing stations and to the fishermen and members of the trade, are:

Where should the smolts be reared and how many should be produced to give the maximum possible yield of salmon?

With the coded wire tag we have a tool which can be used to provide the data to answer these questions. The enthusiastic assistance given in the project by fishermen and traders will be rewarded in due course by the enhancement of the stocks of salmon on which their livelihood depends.

#### Acknowledgements

The tagging was carried out by Tom McDermott and much of the success of the programme must be ascribed to his commitment. Tagging took place at the Eastern Regional Fisheries Board's rearing station at Virginia, the Western Board's station at Cong, the Salmon Research Trust at Furnace, the Galway Fishery and the ESB's rearing stations at Parteen and Carrigadroghid. The help obtained from the personnel at all these stations is greatly appreciated.

The recovery programme was carried out by Summer Bursary Students, Con Burns, Caroline Markey, Barry O'Brien, Gerard O'Leary, David Stone and Jimmy Ward directed by Technicians from the Fisheries Research Centre of the Department of Fisheries & Forestry - Liz Barnwall, Barney Doolin, Paddy Gallagher and Tom McDermott. The recovery programme in the Limerick city area was carried out by Paddy Barry of the Electricity Supply Board's staff. I would like to thank Anne Cullen for helping in the co-ordination of the tag recovery programme and Chris Moriarty for his work on editing.



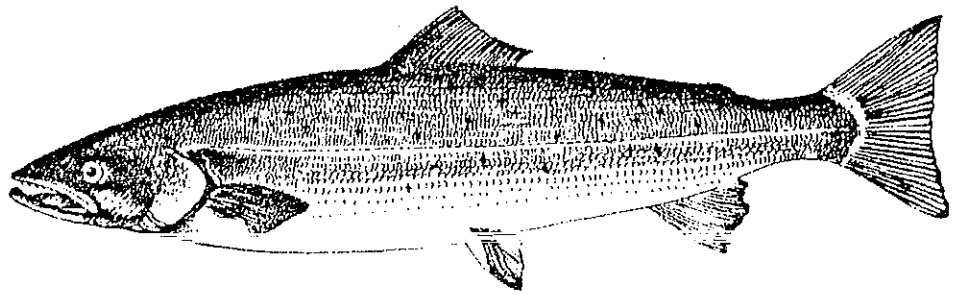
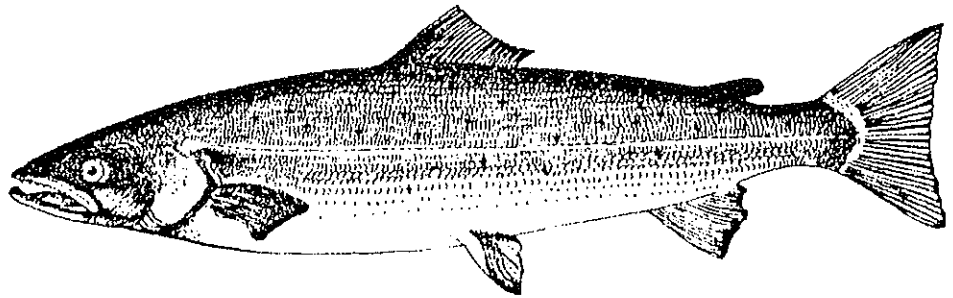


Figure 1 Shows a salmon with the adipose fin removed (lower fish).

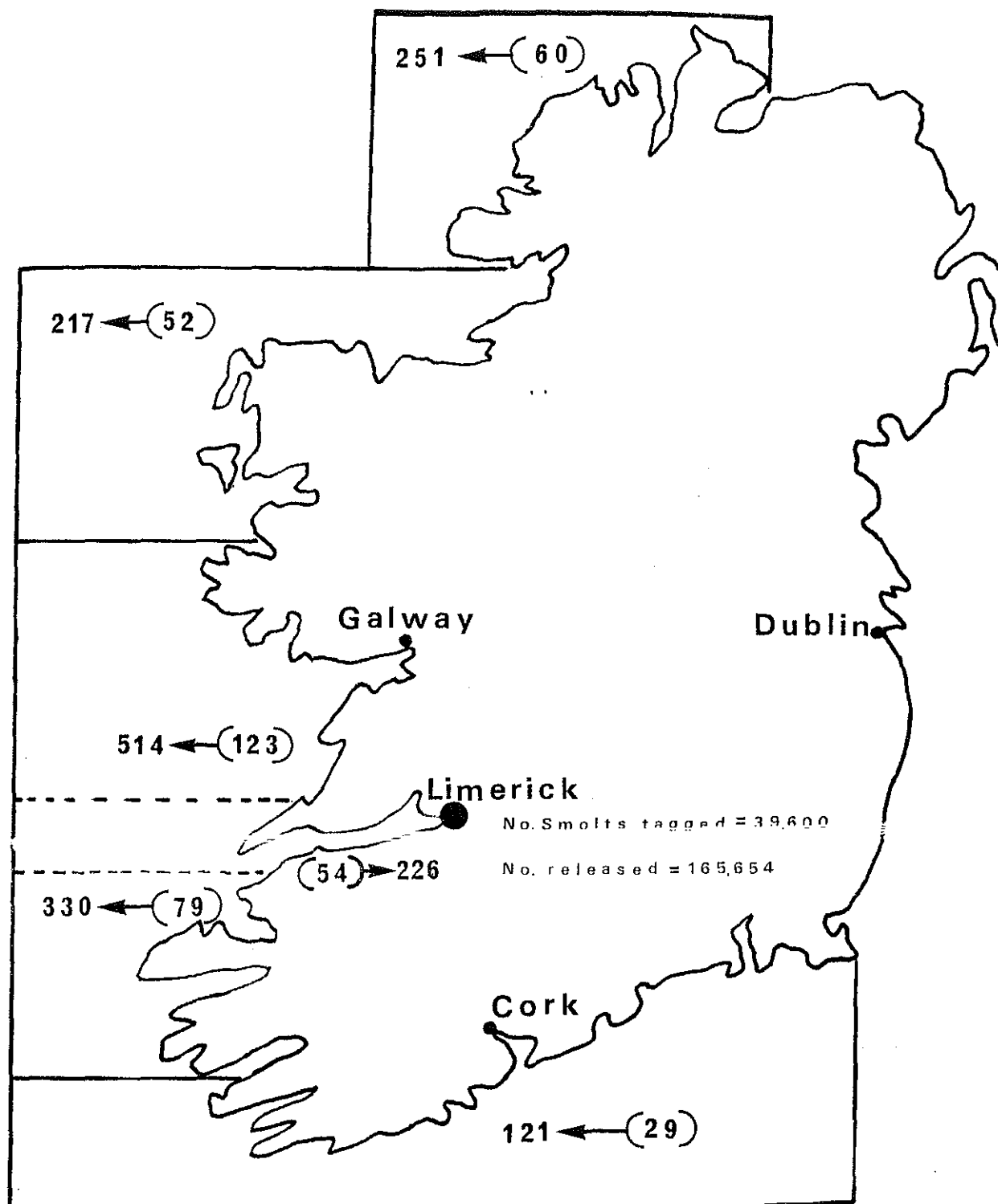


Figure 2 Recoveries from smolts tagged and released at Parteen Rearing Station. Numbers of micro-tags recovered in brackets. Arrowed figures give an estimate of total number of Parteen reared salmon caught in each sea area. Sea areas of Galway-Limerick and Kerry-Limerick overlap.

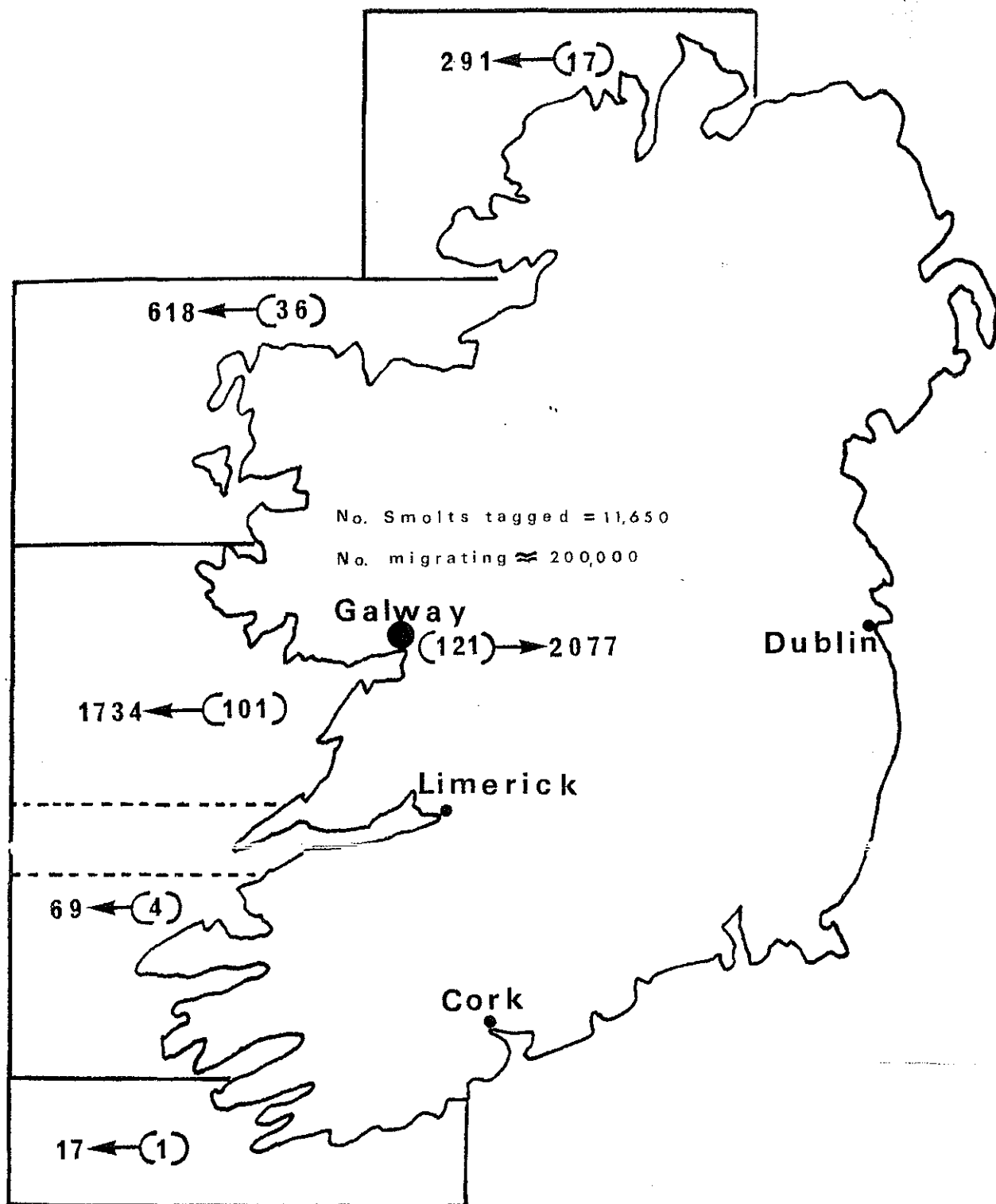


Figure 3 Recoveries from natural and reared smolts tagged and released from the Corrib system. Numbers of micro-tags recovered in brackets. Arrowed figures give an estimate of total number of Corrib salmon caught in each Sea Area. Sea Areas of Galway-Limerick and Kerry-Limerick overlap.

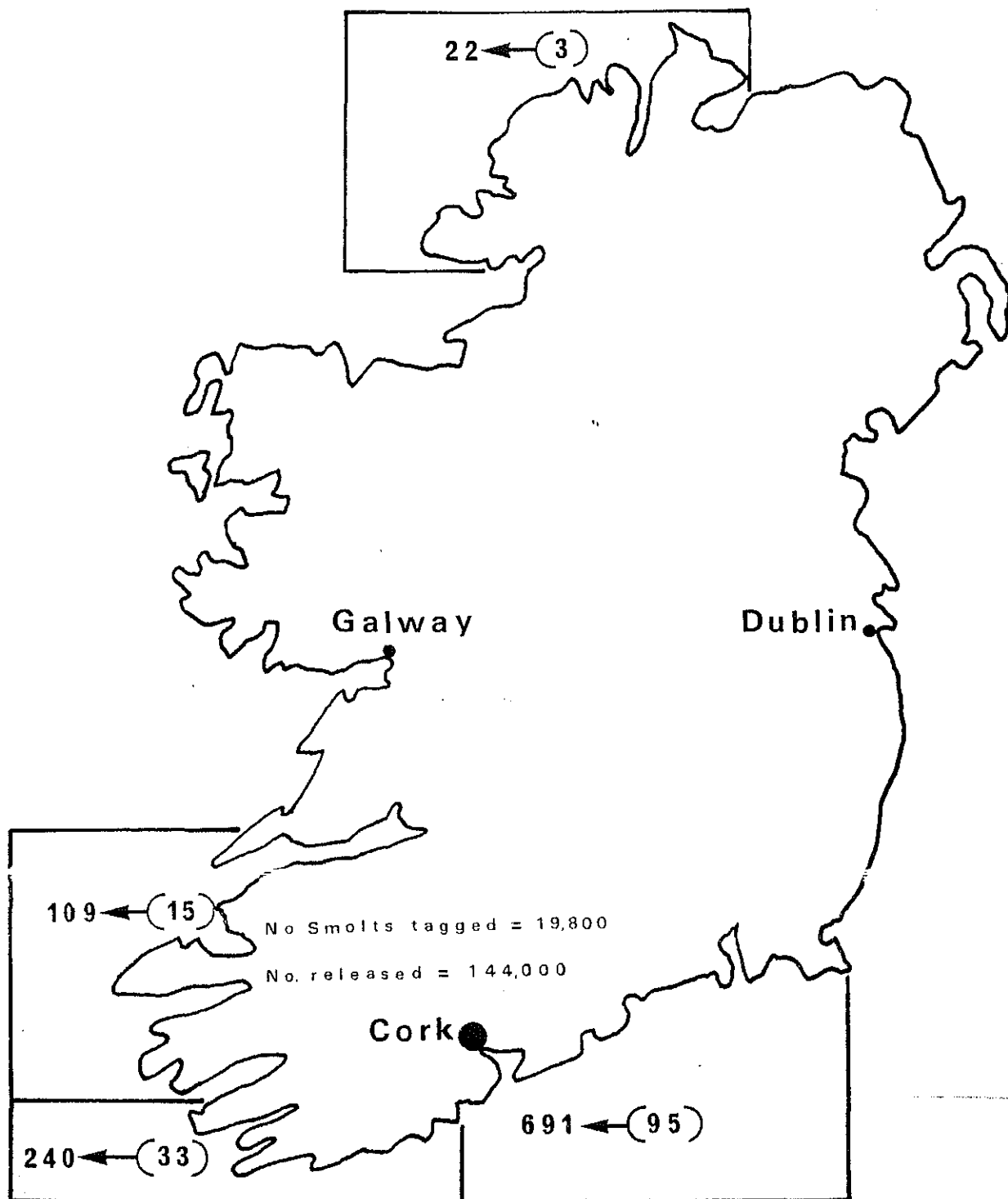


Figure 4 Recoveries from smolts tagged and released at Carrigadroghid Rearing Station. Numbers of micro-tags recovered in brackets. Arrowed figures give an estimate of total number of Carrigadroghid reared salmon caught in each sea area.

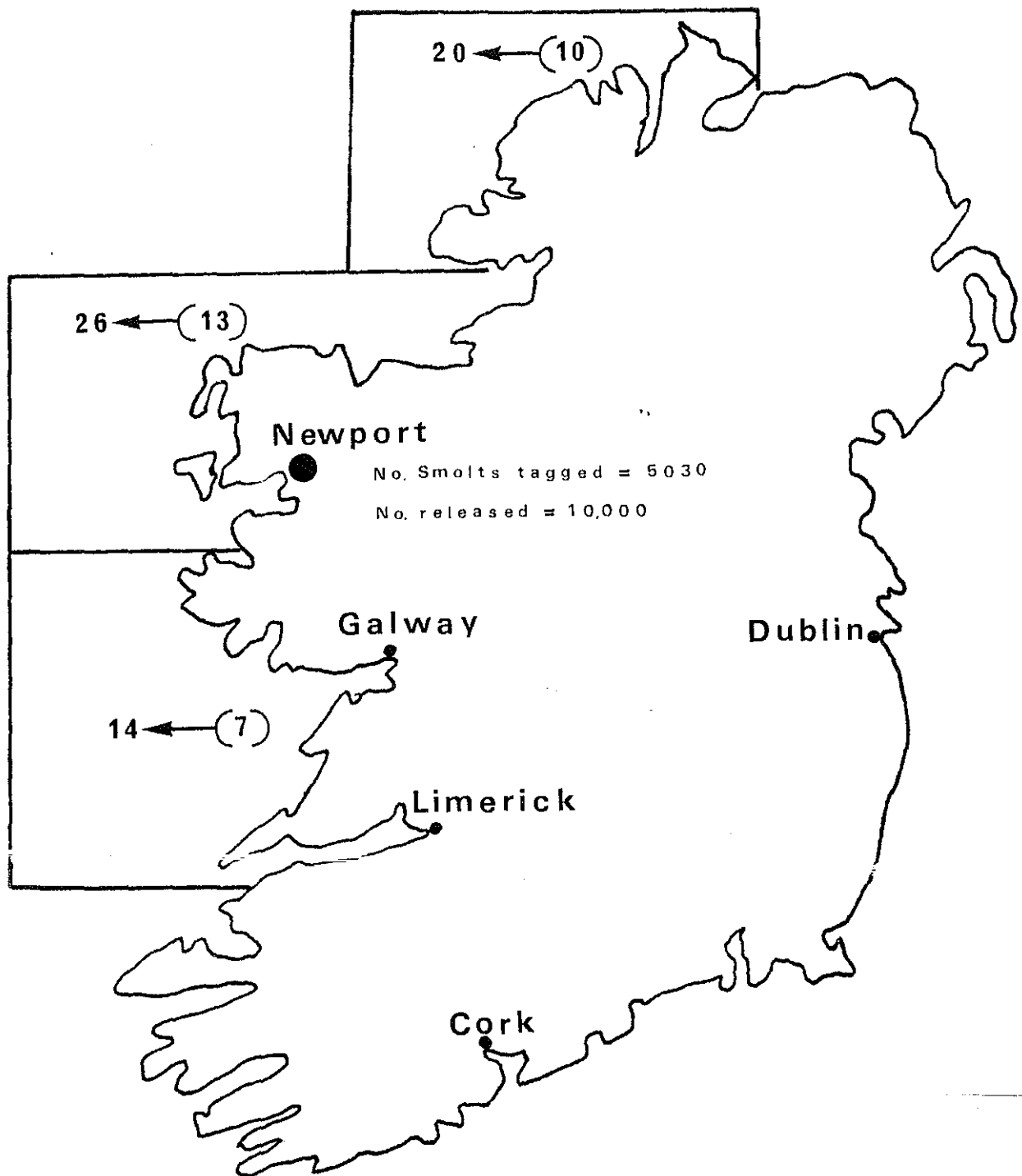


Figure 5 Recoveries from smolts tagged and released at the Salmon Research Trust's Rearing Station at Furnace. Numbers of micro-tags recovered in brackets. Arrowed figures give an estimate of total number of Furnace reared salmon caught in each sea area.